Should GPs have direct access to neuroradiological investigation when adults present with headache?

'The role of the specialist is to reduce uncertainty, to explore possibility, and to marginalise error. The role of the GP is to accept uncertainly, to explore probability, and to marginalise danger.'[1]

INTRODUCTION

The annual incidence of adult primary brain tumour is 0.01%, of which 72% of patients will present above the age of 50 years.[2] Although secondary brain tumours are more common than primary tumours, they are rare as the first manifestation of cancer.[3] Although patients with a brain tumour can present with a number of symptoms, headache is invariably a cause for concern for both patient and doctor; however, there is a wide discrepancy in GP access to neuroradiological investigation to exclude this possibility. When a patient presents to their GP with headache, the risk of a brain tumour is 0.09%.[4] There is no consistent clinical pattern to the features of headache associated with tumour,[5] but the majority will present with additional clinical features. Only 2–16% of primary tumours will present with isolated headache.[6–8]

HEADACHE CARE PATHWAYS

In the UK, the annual primary care consultation rate for headache is 4.4 per 100 patients.[9] Although only 3% of headache consultations are referred to secondary care,[9] headache is the most common cause of neurological referral, accounting for over 20% of new cases.[10] There is no difference in headache impact between neurology headache referrals and patients managed in primary care, but patients who are referred consult more frequently and have higher levels of headache-related anxiety.[11]

Although there may be benefits from early investigation and diagnosis, these are often marginal; a key factor for referral is patient reassurance[12] but, in terms of symptoms and anxiety, studies examining the effects of investigation for headache on clinical outcomes produce conflicting findings.[13–15] The disadvantages of investigation are cost and the anxiety provoked by finding incidental abnormalities. These factors have yet to be integrated into a comprehensive economic framework to establish the cost effectiveness or cost benefit of investigation.

Although a number of headache investigation guidelines have been compiled,[16–20] developing a rigorous evidence base remains problematic. For example, existing evidence is derived from specialist centres and is limited by small sample sizes, a wide range of estimates, and retrospective recall bias. There is also uncertainty over the relevance of abnormal findings to clinical presentations.

The context in which the decision is made to refer a patient to secondary care also plays an important part.[12] In secondary care, patients often anticipate the exclusion of secondary pathology and consultants are under pressure to make a diagnosis at the first appointment; in primary care, frequent review can monitor the development of relevant features. Other contextual factors include: clinical confidence; time constraints within the consultation that may prevent adequate reassurance; local availability of investigation; and approaches to risk of patient, doctor, and medicolegal concerns. These contextual factors and the poor evidence base have resulted in a wide range of investigation patterns, with headache investigation rates of >60% for neurologists.[21] Where GPs have direct access to neuroradiological investigation, reported rates are between 1.2–5.3%.[22–25]

NEURORADIOLOGICAL FINDINGS IN PATIENTS WITH HEADACHE

The prevalence of significant abnormalities with isolated headache (no associated significant signs) is extremely small. Imaging all patients who present to secondary care with headache and a normal neurological examination yield significant clinical abnormalities of between 0.7% and 0.9%;[26,27] when investigation is clinically selective, the yield is 2.1%.[21,26] Repeated investigation or radiological enhancement does not increase the yield of abnormalities.[26] These rates are close to the background prevalence rate; for example, a large study of fit, young males found that 0.51% had vascular abnormalities and 0.47% intracranial tumours.[28]

The identification of incidental pathology, its clinical relevance, and the unnecessary anxiety it incurs is well recognised and can be significant. Population studies yield abnormalities ranging from 0.6% to 2.8%[26,29–31] In selected populations the rates are higher; for example, a recent study of patients with headache who were referred by GPs for computerised tomography (CT) gave a 10% rate of incidental findings.[22]

Outcomes when GPs have direct access to neuroradiological investigation

From a broader clinical perspective, open access by GPs to neuroimaging has a good diagnostic yield and influences the management of most patients with similar diagnostic yields to hospital specialists.[32,33] Studies of GP open access to CT for headache report significant abnormalities of between 1.4% and 2.4%,[22,34] in line with recommended risk levels for investigating headache in primary care.[19] Three studies have reported on the impact on secondary care referrals when GPs have access to investigations:

- a randomised trial reported neurology referral rates of 23% for treatment as usual or 1.3% when GPs had access to magnetic resonance imaging (MRI) — giving a referral reduction of over 90%;[14]
- a prospective study with CT showed a reduction of 86%;[22] and
- a retrospective study of MRI showed that referral was avoided in 41% of patients.[35]

CT or MRI?

The decision whether to use CT or MRI will be a function of sensitivity, side effects, and cost. Current guidance suggests there is insufficient data to make evidence-based

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recommendations on the relative merit of MRI and CT in non-acute headache.[17,20] There are a number of relevant factors:

- Theoretically, CT is less sensitive than MRI. Although there are no direct comparisons for headache, similar populations show comparative ranges for positive findings.[26] However, headache without the development of additional signs or symptoms for longer than 12 weeks will rarely be due to a tumour[36,37] and close follow-up will reduce false negatives. In the rare case of an initially missed tumour using CT rather than MRI, the clinical benefits of an earlier diagnosis in adults are likely to be marginal.
- The incidence of false positives increases almost twofold when using MRI compared with CT.[21]
- There has been concern over the increased use of CT and subsequent ionising radiation exposure.[38] Although the mechanisms for quantifying radiation risks are contested, with an effective radiation dose of <2 mSv (equivalent to <8 months of natural background radiation and less than the dose associated with plain-image radiographs of the lumbar spine or abdomen), CT head examinations are among the lowest-dose CT studies performed.[39]
- CT is cheaper; 2010 NHS tariff prices without contrast and with report are £104 for CT and £211 for MRI;
- CT is generally more readily available than MRI.

Investigation of females who are pregnant needs specialist advice and is outside the scope of this paper.

CONCLUSION

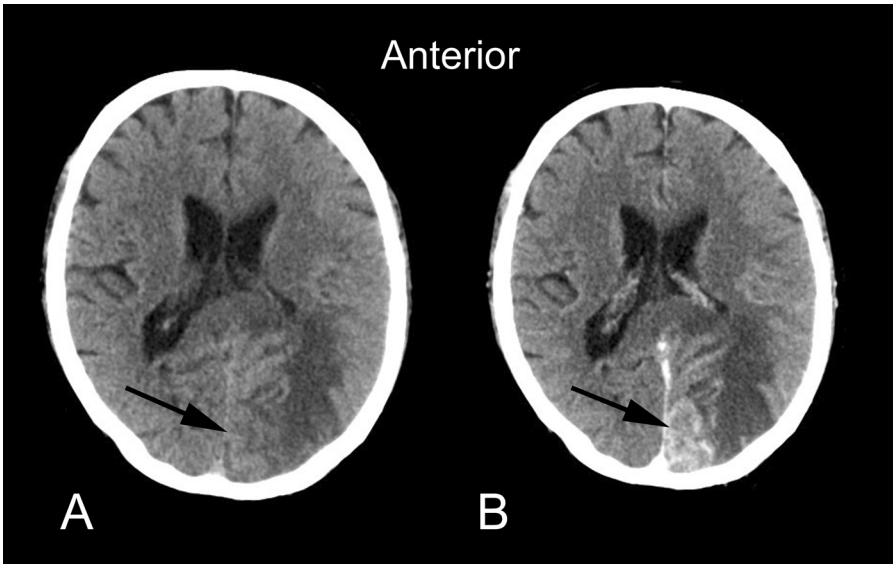
When patients present with headache, the evidence base to support a decision on who to investigate and how to do so is limited and of poor quality. It may be that the development of a headache service for GPs with a special interest would reduce investigations and provide a more cost-effective service overall, but there is currently no rigorous evidence to support other care pathways.

The prevalence of significant abnormalities that cause headache is extremely low, particularly for isolated headache. Although many scans are undertaken for reassurance, the prevalence of insignificant abnormalities is likely to be as high as 10% and the anxiety this can incur should not be overlooked.

Until rigorous studies comparing the cost utility and cost benefit of CT/MRI are available, the existing evidence suggests that GPs can refer for investigation appropriately and reduce secondary care referrals. We suggest that GPs have direct access to CT, unless patients with headache present with associated neurological signs and urgent neurological referral is indicated. The additional benefit of MRI is not commensurate with its extra cost, particularly in an area where positive findings are so small and the increased number of incidental findings with MRI is likely to cause additional anxiety.

It is important to emphasise that a normal investigation of any type does not exclude the need for further follow-up to identify false negatives. There are also some key secondary causes of headache that can result in normal imaging; it is important to note that a normal investigation does not eliminate the need for appropriate management of a primary headache. Feedback and clarity on GPs' investigation patterns — including both the reason for referral and the implications of the radiological reports — would be important elements of any service development.

CT scan of a brain tumour without (A) and with (B) contrast.



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